THE ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

TUESDAY last being St. Andrew's Day, the anniversary meeting of the Royal Society was held in their apartments at Burlington House. The auditors of the Treasurer's accounts having read their report, and the Secretary having read the list of Fellows elected and deceased since the last anniversary, the President (Lord Lister) proceeded to deliver the anniversary address. The medals were then presented.

The Society next proceeded to elect the officers and council for the ensuing year. The following is a list of those elected:—President: Lord Lister. Treasurer: Sir John Evans, K.C.B. Secretaries: Prof. Michael Foster, Prof. Arthur William Rücker. Foreign Secretary: Sir Edward Frankland, K.C.B. Other Members of the Council: Prof. William Grylls Adams, Prof. Thomas Clifford Allbutt Sir Robert Stawell Ball, Rev. Thomas George Bonney, Prof. John Cleland, Prof. Robert Bellamy Clifton, Prof. James Alfred Ewing, Mr. Alfred Bray Kempe, Dr. John Newport Langley, Dr. Joseph Larmor, Prof. Nevil Story Maskelyne, Prof. Raphael Meldola. Prof. Edward Bagnall Poulton, Dr. William James Russell, Dr. Dukinfield Henry Scott, Prof. Walter Frank Raphael Weldon.

The following is the address of the President:—

Since the last anniversary meeting fifteen Fellows and six Foreign Members have passed away.

The deceased Fellows are—

Edward Ballard, January 19, 1897, aged 76.
Charles Tomlinson, February 15, 1897, aged 89.
Samuel James Augustus Salter, March 1897, aged 72.
James Joseph Sylvester, March 15, 1897, aged 83.
Edward James Stone, May 9, 1897, aged 66.
Major-General Robert Mann Parsons, May 20, 1897, aged 68.
Sir Augustus Wollaston Franks, May 21, 1897, aged 72.
Sir John Charles Bucknill, July 19, 1897, aged 79.
Right Hon. Anthony John Mundella, July 21, 1897, aged 72.
William Archer, August 14, 1897, aged 65.
Lieutenant-General Sir William Francis Drummond Jervois, August 17, 1897, aged 76.
John Braxton Hicks, August 28, 1897, aged 74.
Charles Smart Roy, October 4, 1897, aged 43.
James Heywood, October 17, 1897, aged 87.
Rev. Samuel Haughton, October 31, 1897, aged 76.

The Foreign Members are—

Emil Heinrich du Bois Reymond, December 26, 1896, aged 79.
Carl Weierstrass, February 20, 1897, aged 82.
Alfred Louis Olivier Des Cloiseaux, May 8, 1897, aged 79.
Julius von Sachs, May 29, 1897, aged 65.
Johannes Japetus Smith Steenstrup, June 20, 1897, aged 84.
Rudolph P. H. Heidenhain, October 1897, aged 63.

Of these some seem to demand special notice from this Chair.

In Sylvester, English mathematical science has lost one of its best known and most gifted exponents. During his long and active career he wrote several hundreds of memoirs on the most refined and technical parts of pure mathematics. It is not for me to attempt to enumerate even the most important of his labours, which were as solid as they were brilliant. To quote the words of one well qualified to judge, "originality, imagination, and enthusiasm were the ever present notes in the chords which he struck with a master's hand; and it may be safely predicted that he will always find an honoured place in the small roll which contains the names of the men who have been pre-eminent in the science which he loved and to which he devoted his life."

Our Fellow for more than fifty years, he received the highest recognition our Society can bestow, having been awarded a Royal Medal in 1861, and the Copley Medal in 1880. No less was he honoured by other countries, foreign scientific academies having showered their distinctions upon him. Thus full of honours, as of years, he died at the advanced age of eighty-three.

In Sir Augustus Wollaston Franks we have lost one of the most distinguished archæologists of this or any other country. During a connection with the British Museum extending over a period of forty-five years, he practically founded the Department of British and Mediæval Antiquities and Ethnography, and its growth was in no small degree due to his private liberality.

In all that related to the subject of the antiquity of man, he was one of our first authorities; and the Christy collection of which he was a trustee, and which is now incorporated with the British Museum, assumed its present great importance under his careful superintendence and through his generous aid. The mediæval collections which he bequeathed to the nation testify alike to his taste and judgment and to his rare munificence.

The Rev. Dr. Haughton was a man of great intellectual power and amazing versatility. He made original contributions, based often upon very laborious researches, to physics, chemistry, geology, biology, and medicine, while continuing to discharge from time to time the functions of a minister of the gospel. If his many-sidedness prevented him from attaining a high eminence in any one branch of science, it pre-eminently fitted him for the place he was to fill in the government of a large educational institution.

After receiving his school education in his native town of Carlow, he proceeded to Trinity College, Dublin, where, his brilliant studentship having procured him a Fellowship at an unusually early age, he threw himself with great zeal into the educational work of the University. As a boy he had been fond of geology, and as a young man he so greatly distinguished himself in it that at the age of thirty he was appointed to the Geological chair in Trinity College. Here he found himself unable to deal satisfactorily with fossil remains without a knowledge of comparative anatomy, and for this an acquaintance with human anatomy seemed an essential preliminary. Thus he was drawn to Medicine, for which indeed he had an early predilection; and entering comparatively late in life on medical study, he devoted himself to the entire curriculum with characteristic energy. Soon after he had taken his medical degree, an epidemic of cholera occurred in Dublin, and he showed the true spirit of a devotee of Medicine by placing himself at the head of a band of medical students, to supply the want of any adequate system of nursing. In this self-denying labour Haughton bore more than his full share, and its beneficial results left in his mind an abiding sense of the value of bedside work. He was thus led to found medals for the encouragement of clinical study; and the last act of his life was, out of very scanty savings, to provide for making those rewards more substantial.

In the course of his studentship he had been deeply impressed with the abuses which then existed in the medical department of Trinity College, and on becoming connected with the governing body, he entered on the task of reform with indomitable courage; and it was mainly due to his exertions that the school was raised from a comparatively subordinate position to the leading place which it now holds.

The high opinion entertained of him by his colleagues was shown by the fact that he was for many years their representative on the General Medical Council. He was of a most genial and loyal nature, and it is said of him that, while he made many friends, he never lost one.

Edward Ballard was one of the chief promoters of the sanitary science of the Victorian era. His researches into problems regarding public health, which extended over forty years, were characterised by very remarkable far-sightedness and exactitude. To him we are indebted for most of our certain knowledge on the subject of effluvium nuisances in their relation to health, and for the indication of trustworthy means of mitigating the deleterious influences of noxious trades. He, too, was among the first to insist on the importance of strict study of the ætiological relations of "sickness" and "mortality"; and by his labours in this connection he laid a foundation for that system of compulsory notification of infectious illness which is now practically universal in this country. But Dr. Ballard's completed work in these and other directions by no means represents the full measure of the value of his services to public health. By his industry in the accumulation of facts bearing on a number of unsolved problems, and his exposition of such facts in their several connections, he has not only indicated lines of further research, but has tended to lighten the labours of those who will come after him. He was a man of noble nature; and the devotion of his great abilities to the service of mankind was utterly devoid of self-seeking.

James Heywood was a man of considerable scientific attainments, who deserves to be specially remembered on account of his great services in the cause of university reform. He was born in 1810 at Everton, Lancashire, and on leaving school at Bristol, entered Trinity College, Cambridge, where he was

Senior Optime in 1833. He could not, however, proceed to his degree until twenty-three years later, on account of the religious tests which were only abolished in 1856 by the Cambridge University Reform Act. Of this, as member for North Lancashire, he was the chief promoter: for, already in 1854, he moved and carried, after several previous attempts, a clause by 233 against 78, in favour of the abolition of religious tests for the Bachelor's degree in Arts, Laws, Medicine, and Music. There can be no doubt that this fundamental reform led the way to the introduction of experimental science into our universities.

He was one of the original trustees of Owens College, Manchester, and took a keen interest in the establishment and development of the scientific chairs in that institution. He was elected into the Royal Society in 1839, and was, at the time of his death, the Fellow of longest standing.

On February 19 last, Karl Weierstrass, one of our Foreign Members, died in his eighty-second year. He was elected a Foreign Member in 1881, and in 1895 the Copley Medal was awarded to him in recognition of the contributions he had made to pure mathematics. The grounds on which the award was made were set out in the President's Address in that year; and so it is not necessary now to refer in detail to his researches. The results which he obtained and the rigorous precision of method which he adopted have made his influence remarkable; and it can fairly be claimed for him that he is not the least eminent on the roll of the great mathematicians of the century.

Alfred Des Cloizeaux was a veteran mineralogist of great eminence. His first paper was published fifty-four years ago, and was the beginning of a long series treating of the forms and optical characters of crystals. After being Professor of Mineralogy for eighteen years at the École Normale Supérieure, he was appointed to the charge of the minerals at the Musée d'Histoire Naturelle, in which office he remained until he reached the limit of age prescribed by the rules of the French Civil Service. His fame rests upon the thoroughness and accuracy of his systematic investigation of the crystals of minerals, more especially as regards their optical properties. The results are incorporated in his "Manuel de Minèralogie," a standard book of reference. Prof. Des Cloizeaux died in the eightieth year of his age.

In Julius von Sachs botanical science has lost one of the most conspicuous figures of the latter half of the century. His widespread influence was due in the main to two memorable books. In his "Experimental-Physiologie" (1866) he at once put the subject on a new footing. He returned to the methods long ago pursued by Hales and Knight in this country, and, while giving a critical estimate of the results achieved by his predecessors, everywhere turned the light of experimental investigation on the problems presented by the living plant. The success which he met with was due to a broad grasp of general principles and a singular directness of aim at the object in view, associated with great experimental skill. In his mechanical ingenuity and aptitude for making simple yet effective appliances he somewhat resembled Faraday.

His "Lehrbuch" (1868) produced a profound impression on the teaching of botany both in Europe and America. It did for botany what Gegenbaur achieved for zoology, in presenting the morphological facts of the vegetable kingdom for the first time as a whole. As with the "Experimental-Physiologie," it was no mere compilation, but was at every point subjected to the test of original investigation.

Sachs, moreover, presented the somewhat unusual combination in science of great gifts of original investigation accompanied by no less great gifts of exposition. The insight of his attack on a problem was equalled by the masterly lucidity with which he expounded his results.

Emile du Bois-Reymond, who died in December of last year at the age of seventy-eight, was a Foreign Member of the Royal Society since 1877. Although born in Berlin, he was of French-Swiss extraction, his father being a native of Neufchâtel, and his mother belonging to a French Huguenot family. He studied in the Universities of Berlin and Bonn, and took his Doctor's degree in Medicine in Berlin. In 1840, at the age of twenty-two he became the assistant of Johannes Müller, whose successor he was appointed, in the chair of Physiology in Berlin, in 1858. He has himself told us that it was Johannes Müller who first turned his attention to the study of animal electricity, to which the labours of his life were chiefly devoted. His publications on the subject were very numerous, while his observations were characterised by mathematical accuracy which stamped them as trustworthy. And it is not too much to say that his discoveries constitute the main fabric of our knowledge of animal electricity.

Although his energies were chiefly devoted to one branch of physiology, he was not unmindful of other departments of the science. Ever since 1859 his name has been associated with the editorship of the "Archiv für Anatomie und Physiologie," which he carried on in conjunction with Reichert, after the death of Johannes Müller. He was a man of wide sympathies and high culture. His semi-popular discourses, scientific, literary, and historical, are models of well-selected language, clear exposition, and deep erudition. His address "On the Limits of Natural Knowledge" has passed through numerous editions, and has been translated into many languages. Du Bois-Reymond ranks with men like Bernard, Brücke, Helmholtz, and Ludwig, as one of those by whom the science of modern physiology has been built up.

As regards the work of the Society during the past year I have little to add to the Council's Report.

On July 15 I had the honour of taking part in a deputation to the Queen at Windsor to present the address of congratulation which had received the sanction of the Society. On this memorable occasion I was accompanied by the other officers, including all the Vice-Presidents, and also by three former Presidents, whom we all revere, Sir Joseph Hooker, Sir George Stokes, and Lord Kelvin. Her Majesty received us in person, and made the following very gracious reply:—

"I thank you for your loyal and dutiful Address. I am much gratified by the attachment which your ancient and learned Society expresses to my Throne and Person.

"I am fully sensible how far the labours and ingenuity of men of science, whom you worthily represent, have advanced the industrial and social prosperity of my people, and have tended alike to their good and refinement, and I confidently expect the same excellent fruit in years to come from the indefatigable and reverent investigation of nature for the promotion of which the Royal Society was founded."

In the early part of the year a deputation from the Royal Society, the British Association, and several others of the most important scientific and technical societies, waited upon the Prime Minister to urge upon him the importance of establishing in this country a National Physical Laboratory in which the testing and verification of instruments and the construction and improvement of standards of various kinds should be undertaken in a regular and systematic way. There was nothing new in principle in this proposal. Work of the kind referred to has for many years been carried out at Kew under the auspices of the Royal Society. It has been as successful as the limited means at the disposal of the Kew Observatory Committee would allow; and all that is needed is sufficient State aid to enable work of the same kind to be done on a larger and more useful scale.

It is satisfactory to be able to state that the efforts of the deputation were not in vain. A committee, of which Lord Rayleigh is chairman, has been appointed by the Treasury to investigate and report upon the desirability of the scheme. Evidence is being taken, and we may fairly hope that the Government will finally consent to promote an undertaking which could not fail to advance the interests both of pure science and of scientific industry.

In January last I was requested by the Council to approach the India Office in order to call their attention to Yersin's treatment of bubonic plague, which was causing such grave anxiety in the Bombay Presidency. I gladly undertook this service, as I had been greatly impressed with an account which that distinguished man, himself an independent discoverer of the plague bacillus, had given of a trial he had made of his remedy in China. The cases were, indeed, not very numerous, but the success recorded was most striking, and was in every detail so exactly proportioned to the shortness of the duration of the disease at the time when the treatment was begun that it was difficult to conceive it to be a matter of accidental concomitance. A similar correspondence of results with theory, taken along with complete trustworthiness of the source of information, had made me early feel and express confidence in the analogous serum treatment of diphtheria, which has since proved of such signal benefit to the community.

I was received at the India Office with the utmost cordiality, and I am not violating confidence when I say that my representations tended to strengthen the Home Government in their disposition to afford encouragement to M. Yersin to labour in the stricken district.

The vague rumours which reached us some time ago regarding his work in Bombay were not of an encouraging character. But I was glad to see from a paper read lately by M. Metchnikoff at the International Medical Congress in Moscow, that the treatment had been by no means a complete failure, and that the smaller degree of success than that obtained in China was sufficiently explained by the fact that the serum in the present state of knowledge takes a very long time to prepare, and Yersin had been obliged to employ what he knew was not as potent as that which he used in China. We may therefore fairly hope that in due time, if the pestilence should last so long, the original full measure of success will be again obtained.

The communications made to the Society during the year have been of a high order of excellence. In illustration of this I must content myself with referring to two examples taken from the domains of physics and biology respectively. The remarkable series of ten papers by Profs. Dewar and Fleming, describing their continued researches on the electric and magnetic properties of matter at low temperatures, have brought before us new facts of fundamental importance. Such, for instance, is their discovery that at very low temperatures the electrical resistance of bismuth is remarkably increased by transverse magnetisation; so much so that the observations seem to indicate that at the absolute zero pure bismuth would be a perfect conductor if not in a magnetic field, but a perfect non-conductor if transversely magnetised.

The illustration which I will take from the domain of biology is the recent communication of Mr. Gardiner on the Histology of the Cell-Wall. Before 1883, when his former paper on this subject was published in our *Proceedings*, other observers had seen and described threads passing through the walls of certain vegetable cells, and supposed to connect the protoplasm of one cell with that of adjacent ones. But the observation had only been made in certain exceptional cases, and, moreover, they were not of such a character as in Mr. Gardiner's opinion to afford conclusive evidence that the threads really consisted of protoplasm. Since the date referred to he has laboured at this most important subject with remarkable ingenuity and perseverance; and by new methods of preparation varied to overcome the special difficulties presented by the various forms of tissue, he has succeeded in demonstrating, throughout the long series of cases which he has already examined, the presence of threads of undoubtedly protoplasmic nature, often of exquisite delicacy, passing in large numbers through the walls of adjacent cells, not only where they are thinned by the presence of pits, but elsewhere also. And to use his own words, "there can be little doubt that such connecting threads occur universally in the cells of all the tissues of all plants. From this arises the fundamental conception that the plant body must be regarded as a connected whole." And the transmission of impulses and of nutrient material from one part of the vegetable organism to another, quite unintelligible as long as the protoplasm of each cell was believed to be shut off from that of its neighbours by a wall of cellulose, receives a ready explanation.

The attendance at our meetings during the past session has been very satisfactory. There can be no doubt that the great improvement which has taken place of late years in this respect has been in no small measure due to the alteration of the time of meeting to the afternoon, which is more convenient to the large majority of the Fellows than the evening. I thus freely admit that the change has been very advantageous, although I was opposed to it when it was made, as I was apprehensive that it would interfere with participation of members of my own profession in the work of the Society; for I should greatly regret anything like a severance of Medicine from the Royal Society, believing as I do that they are very helpful to each other, medical practice affording the suggestion and stimulus of much scientific investigation, while it is often the ultimate test of the validity of the conclusions arrived at.

At the risk of seeming to dwell too much upon matters connected with the healing art, I am tempted to refer to one recent instance of its intimate connection with science. In the Society's *Proceedings* for 1893 (vol. liv. p. 187) appeared a paper by Dr. Monkton Copeman, relating important researches on Variola and Vaccinia, and referring to a discovery which he had announced two years previously at the International Hygienic Congress, in London (*Trans.* of Internat. Congress of Hygiene, 1891), that an admixture of glycerine in certain proportions with vaccine lymph derived from the calf had the effect of causing, in no long time, the disappearance of what he termed the "adventitious microbes" invariably present in that material at the outset, without diminishing the efficacy of the lymph for the purpose of vaccination. It had been known before that glycerine might be added to the lymph without destroying its vaccinal property, but that it would thus cause the disappearance of concomitant microbes was quite new. In the scant intervals of leisure permitted by his duties as inspector under the Local Government Board, Dr. Copeman has continued to prosecute his researches. He has ascertained, among other things, that if tubercle bacilli are intentionally mixed in considerable quantity with the lymph, they soon lose their life under the influence of the glycerine, thus removing the last rational objection that could be urged against vaccination. For while the use of calf lymph excludes the possibility of conveying human disease in general by the process, the cow, like man, is liable to tuberculosis. It is true that tubercle is very rare in the young animal, and that the practice of killing the calf after it has furnished the vaccine and subjecting the body to competent inspection before the lymph is set aside for use, would reduce the risk of communication of the disease almost to zero. But it is satisfactory to learn that Dr. Copeman's process makes such a thing absolutely impossible. It further turns out that the use of the glycerine, so far from impairing the efficacy of the lymph for vaccination, considerably enhances it; so that it becomes susceptible of large dilution, one calf thus furnishing material for a much greater number of vaccinations than was formerly thought possible. And further the glycerinised lymph being stored in sterile glass tubes, the chance of contaminating the vaccination scratches with extraneous impurities, somewhat difficult to prevent in vaccinating directly from the calf, is entirely avoided. Lastly, it has been found that the inflammatory disturbance at the seat of vaccination in the human arm, with concomitant febrile disturbance, is greatly lessened by the use of the pure essential ingredient.

Comparatively little advantage has yet been taken of the system in this country. But it has been otherwise abroad; and the English Commission on Vaccination having made favourable reference to the subject, the President of the Local Government Board recently requested their Medical Officer, Sir Richard T. Thorne, to make a tour of inspection of the continental practice. In this he was accompanied by Dr. Copeman, and we learn from the report which they have issued that they found our countryman's precepts very extensively acted on in the various countries which they visited. In Germany, especially, they are carried out with the thoroughness characteristic of that nation, so much so that while arm to arm vaccination has been entirely discarded, the use of glycerine-stored lymph has almost entirely superseded the practice of vaccinating from calf to arm.

It has given me pleasure to learn that Mr. Chaplin is likely soon to propose legislation for the purpose of giving the full benefits of this valuable process to the country of its discoverer.

It afforded great though melancholy satisfaction to the Treasurer and myself to be present last Christmas at the final obsequies of the man to whose labours is due the possibility of carrying on such investigations as those just referred to. M. Pasteur was buried in his own "Institut" with a splendour befitting the memory of so great and good a man.

I have also been glad to be the means, as President of the Society, of aiding our French brethren in erecting a monument to him to whom the world in general owes so much. Having received last year a letter from the Perpetual Secretary of the French Academy inviting my help in raising a fund to supplement that which was being subscribed in France, I called a meeting held here on March 26 of last year, at which it was decided to form a committee, in order to collect contributions to the International Pasteur Memorial. I wrote in the first instance to such of our Fellows as are members of the Academy, requesting them to allow their names to be on the committee, and received in almost every instance a cordial assent. Our Treasurer having consented to act as treasurer to the fund, and Prof. Percy Frankland undertaking the somewhat onerous duties of secretary, a sum has been raised, amounting in all to 877*l.* 0*s.* 3*d.*, from which 17*l.* 7*s.* 2*d.* was deducted for expenses, leaving a balance of 859*l.* 13*s.* 1*d.*

I know that our French friends were much gratified by this result; and I learn from a letter written to the Treasurer by

M. Bertrand, acknowledging a final cheque, that the monument in Paris promises to be worthy of its object.

It is noteworthy that rather more than half the entire sum contributed has come from India, chiefly from the medical officers, through Surgeon-General Cleghorn. It seems probable that their great liberality was prompted by a sense of gratitude for the good work done on Pasteur's lines in that great dependency, such as Haffkine's preventive inoculations against cholera, and the efforts being made to cope with the plague in Bombay.

I have the sad pleasure, if I may so express myself, of announcing that my old friend, that distinguished medical officer and very gallant soldier, Sir William Mackinnon, late Director-General of the Medical Department of the Army, has, by will and codicils dated 1896 and 1897, after making certain specific legacies, including one of 2000*l*. to the University of Glasgow, bequeathed the whole residue of his property to the Royal Society, subject to certain life annuities. The proceeds of the fund are to be applied by the Royal Society for the foundation of such prizes and scholarships for the special purpose of furthering Natural and Physical Science, including Geology and Astronomy, and for furthering original research and investigation in Pathology, as the Society may think best and most conducive to the promotion of those sciences and of original discoveries therein; such prizes and scholarships to be called after the name of the testator.

COPLEY MEDAL.

Prof. Albrecht von Kölliker, For. Mem. R.S.

The Copley Medal is given to one who well deserves the highest honour that it is in the power of the Royal Society to confer. For nearly sixty years past Albrecht von Kölliker has made contributions of the highest value to histology, embryology, and comparative anatomy. Though his labours have embraced so wide a field, they have always been of a high order of excellence, and have often been of far-reaching significance.

His early histological discoveries were invaluable for the systematic development of the cell theory. Of these I must, on the present occasion, content myself with referring to two: his demonstration of the continuity between the nerve fibres and nerve cells of Vertebrata in 1845, followed by his memoir on nerve cells in 1849; and his isolation in 1848 of the cellular elements of smooth muscular tissue, together with his essay on the distribution of smooth muscle in the vertebrate body, and his final demonstration of the existence of muscular tissue in the walls of the blood-vessels, where its presence, although previously asserted by Henle and Sharpey, was at the time denied by Arnold and many others.

These are examples of the histological results achieved by von Kölliker during the first ten years of his scientific activity. They are of fundamental importance, and they have been followed by a long series of other valuable histological discoveries. The whole series show not only his power as an investigator, but the wide range of his knowledge, and the eagerness with which he has appreciated and applied whatever was new in the work of others. This last quality is well shown in his various essays on the structure of the nervous system, from his early acceptance of Remak's statements concerning non-medullated nerves, to his work of the last few years.

Prof. von Kölliker's influence upon histological science is due not only to his fame as an investigator, but in part also to his skill as a teacher and as a writer. Every successive edition of his text-book has been an important addition to the literature of the subject.

Among his embryological papers, that dealing with the development of Cephalopods, dating from 1844, is still a standard work, and figures copied from it are to be found in most modern text-books. His memoir on the development of Amphibia (1846) contains important statements on the behaviour of the nucleus during segmentation, and on the formation of cartilage and blood-vessels. The papers on the development of the skull (1849-50), and the subsequent work on the part played by the notochord and its sheath in the formation of the vertebral column, must be mentioned as of fundamental importance. His many later researches on mammalian embryology, which are summarised in the various editions of his text-book of vertebrate embryology, need not now be mentioned in detail.

Although it is as a histologist that von Kölliker is preeminently distinguished, his zoological papers are numerous and important. Among his labours in this direction were his early demonstration of the unicellular nature of the Gregarinidæ, his description of the Dicyemidæ, his memoirs on the structure and development of the Hydroids and Medusæ, and his later magnificent works on the Alcyonaria.

Many of von Kölliker's papers have appeared in the *Zeitschrift für Wissenschaftliche Zoologie*, founded by him and von Siebold in 1848, of which he is still one of the chief editors. It is pleasing to know that, at the advanced age of eighty, he is still able to prosecute with unflagging zeal his work as an investigator and as a teacher. One of the reasons of his absence to-day is his reluctance to leave his lectures.

ROYAL MEDAL.

Prof. Andrew Russell Forsyth, F.R.S.

One of the Royal Medals is awarded to Prof. Andrew Russell Forsyth on account of his contributions to the progress of pure mathematics.

He is known principally for his excellent treatises on many subjects of mathematical analysis. These works are not mere compilations; they contain original work, and exhibit great creativeness of thought.

The treatise on differential equations was immediately successful, and established firmly his reputation as a teacher. This was followed by a scholarly work on Pfaff's problem and, later, by the treatise on the Theory of Functions, the first in English on the subject, and noteworthy for the manner in which the parallel theories of Cauchy, Riemann, and Weierstrass are marshalled. The appearance of this work is responsible for the newly awakened interest in this country concerning the great works on this subject of Weierstrass, Jordan, Klein, Lie, Poincaré, and Mittag-Leffler.

Prof. Forsyth is, in addition, a prolific author on other subjects covering a wide range of pure mathematics.

ROYAL MEDAL.

Lieut.-General Sir Richard Strachey, F.R.S.

The other Royal Medal is conferred on Lieut.-General Sir Richard Strachey for his investigations in physical and botanical geography, geology and meteorology. Two of the most recent of these are recorded in his report, published in 1888, on the barometrical disturbances and sounds produced by the eruption of Krakatoa, and in his paper in the *Phil. Trans.* of 1893 entitled "Harmonic Analysis of Hourly Observations of the Temperature and Pressure at British Observatories." These, while important in themselves, were but the last of a long series of valuable memoirs. He was the first to treat scientifically of the physical and botanical geography, geology, and meteorology of the Western Himalaya and Tibet. His numerous papers on these subjects, dating from the year 1847, are published in the *Journals* of the Bengal Asiatic, Geological, and Royal Geographical Societies, in the Royal Society's *Proceedings*, and in the Reports of the British Association.

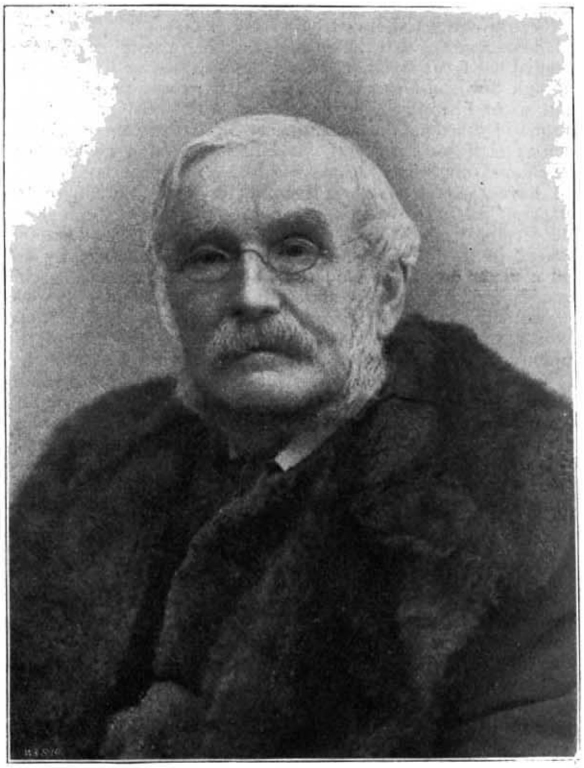
Sir R. Strachey's scientifically annotated and very complete botanical collections made in Kumaon, during his physical survey of that province (in company with Mr. Winterbottom), and in Tibet, at all elevations from 2000 to 18,500 feet, are unique in value and interest, as being the first from which could be determined the successive zones of vegetation according to altitude in the mountains of any part of Asia.

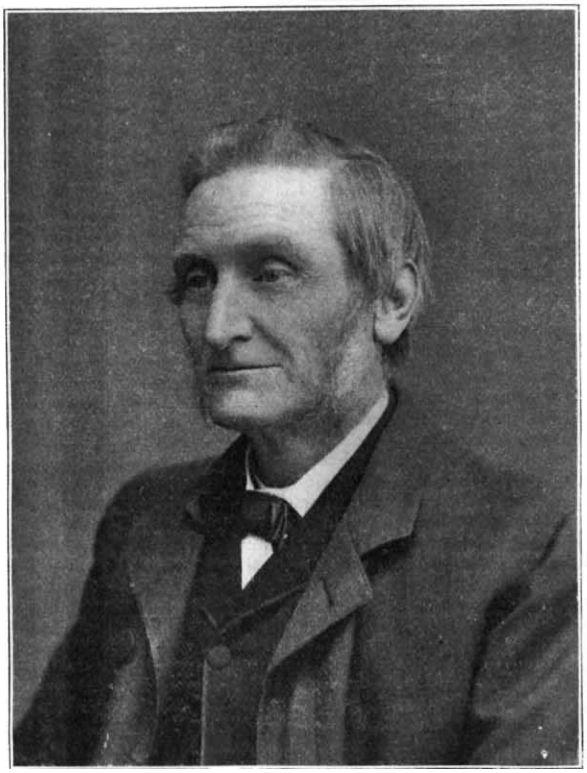
Sir R. Strachey is justly regarded as the founder of scientific meteorology in India, whether by virtue of his early personal labours in that branch of science, or for the zeal and energy with which, during his long career as a member, first of the Government of India in that country, subsequently of the Council of the Secretary of State, he promoted the establishment of meteorological observatories and stations all over our Eastern dominions. Nor were his exertions in this respect confined to meteorology, for there are few scientific institutions or publications now supported by the Indian Government which are not largely indebted for their existence or organisation to his efforts.

DAVY MEDAL.

Dr. John Hall Gladstone, F.R.S.

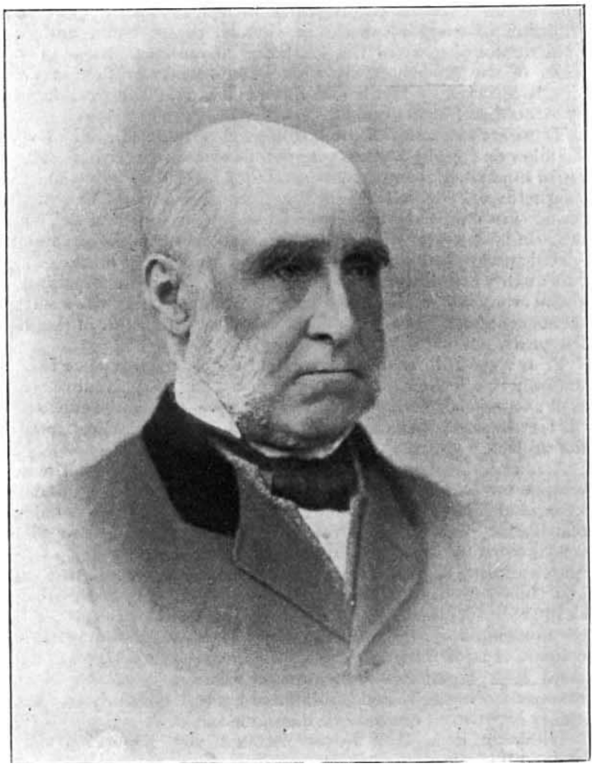
The Davy Medal is awarded to Dr. John Hall Gladstone on the ground of the great extent and value of his chemical and physical researches, extending over a period of forty-nine years. His first paper was printed in 1847, and his last in the *Proceedings* of the Royal Society for 1896. During





[*Photographed by A. J. Melhuish, Pall Mall.*

DR. J. H. GLADSTONE (DAVY MEDALLIST).



[*Photographed at Claudet's Photo. Studio, Regent Street.*

SIR JOHN SIMON, K.C.B. (BUCHANAN MEDALLIST).

this time he has published seventy-six papers, recording the results of his own researches, and forty-eight relating to investigations made in conjunction with other workers.

These papers cover a wide range of subjects. In chemistry he showed, in 1847, that urea is formed by the breaking up of some of the salts of fulminic acid. He demonstrated the composition of the so-called iodide of nitrogen. His memoir on the relations of the atomic weights of the elements suggested analogies with the homologous series of organic compounds. An important monograph on chemical affinity occupies forty-five pages of the *Philosophical Transactions* of 1855; in it the behaviour of salts in solution is discussed with much acuteness.

Amongst Dr. Gladstone's other very numerous contributions to chemical science, may be mentioned the study of the influence of carbonic anhydride on the germination of plants, his researches on the chemistry of storage batteries, on the molecular weight of caoutchouc and gums, and on the zinc-copper couple and its application to the production of organo-zinc compounds and the hydrides of the organic radicals. Dr. Gladstone's new and simple method of producing organo-zinc compounds conferred a most valuable boon upon organic chemistry, and led to the very extensive use of these bodies in organic research, and consequently to many important discoveries in that domain of chemistry.

Amongst Dr. Gladstone's numerous researches in physical chemistry, may be mentioned the following :—"On the Spectra produced by Solutions of Coloured Salts in Hollow Prisms"; "On the Use of the Prism in Qualitative Analysis" (1857) He shows that when a coloured acid and base combine, a solution of the salt so formed only allows those rays to pass which are not absorbed by either constituent separately. He taught us the optical detection of didymium in the same year, and also studied the influence of heat on the colour of saline solutions, showing that whilst in some cases the intensity only of the colour was altered, in others the tint was completely changed. In 1860 he published a useful paper on the use of the polariscope in chemical investigation. Of his other papers on physical subjects, the following may be mentioned :—"On the Connection between the Optical Behaviour, Specific Gravity, and Chemical Composition of Ethereal Oils"; "On the Refraction Equivalents of some Elements"; "On the Refraction and Dispersion Equivalents of Chlorine, Bromine, and Iodine"; "On the Refraction Equivalents of Carbon, Hydrogen, Oxygen, and Nitrogen"; "On the Specific Refraction and Dispersion in Isomeric Bodies"; and (with Dr. Perkin) "On the Relation between Molecular Magnetic Rotation and the Refraction and Dispersion of Nitrogenous Compounds."

One of Dr. Gladstone's most important investigations was the determination of the refractive equivalents of many of the metals. The object was not, however, only to determine these equivalents, but also to answer the question whether any of the elements possessed more than one refractive equivalent. As the refractive indices of the metals could not, on account of their opacity, be directly determined, he operated upon solutions of their salts, first proving, in cases where both solid and solution were available, that the refraction was the same in the solid and in its solution, whether the solvent was aqueous or alcoholic, and whether concentrated or dilute. As the refraction equivalents of all sodium compounds were between 3 and 3·9 less than the corresponding potassium compounds, it was proved that the electro-negative constituent of the salt had the same optical effect no matter with what metal it was combined By taking the refractive equivalent of potassium as 8, and dividing it by the atomic weight (39) of potassium, he obtained for the specific refractive power of that element the number 0·205, and by a similar series of determinations the specific refractive power of sodium, lithium, magnesium, barium, strontium, calcium, zinc, nickel, cobalt, lead, and mercury were ascertained.

BUCHANAN MEDAL.

Sir John Simon, F.R.S.

The Buchanan Medal is presented to Sir John Simon, who may fairly be termed the founder of modern sanitary science.

When, in consequence of the appalling facts relating to the condition of the indigent classes in London which were brought to light by the Sanitary Commission of 1843, powers were conferred by the Legislature on the Corporation for the improvement of so much of the metropolis as is under their control, John Simon was appointed Medical Officer of Health of the city. In this capacity he brought into existence a system of sanitary administration which has served as the model on which similar systems have been organised, not only in Great Britain, but throughout the civilised world.

When, in 1858, the powers of the General Board of Health were transferred to the Privy Council, the knowledge and experience gained by Mr. Simon during his seven years of office in the city were made available for the country at large by his appointment as Medical Adviser of the Government. He held this office for fifteen years, during which he not only energetically and effectually promoted measures of sanitary improvement both in town and country, but initiated a system of scientific investigations to be conducted year by year at the public expense, and it is deeply to be regretted that his plans were not fully carried out.

The funds for this medal were supplied by Sir John Simon's late distinguished pupil, Dr. Buchanan, and it is fitting that the first award should be to the master.

[We are glad to be able to reproduce the portraits of the Royal, Davy, and Buchanan medallists. The portrait of the Copley Medallist, Prof. Albert von Kölliker, will be given on a subsequent occasion in connection with an account of his life and work.]

Report of the Council.

Many of the subjects referred to by the President in his Address at the last anniversary have continued to engage the attention of the President and Council during the past year.

Among the most important duties discharged by the Council is that connected with the consideration of papers communicated to the Society, with a view to ultimate publication in the *Philosophical Transactions* or *Proceedings*. In this duty they have received the most valuable assistance from the Sectional Committees, which were appointed under the Standing Orders mentioned in the last Presidential Address, and which now present a record of their first complete year of working.

In all 116 papers were received between the close of the Session, 1896, and the corresponding period in 1897. Of these, 37 were submitted for publication in the *Philosophical Transactions*, and 70 in the *Proceedings;* and 23 and 75 have been ordered for publication in the two categories respectively.

During the past year 22 papers have been published in the Mathematics and Physics section, and 10 in the Biological section of the *Philosophical Transactions*. The two sections together contain in all 1312 pages of letterpress and 22 plates. Nineteen numbers of the *Proceedings* have been issued, containing 991 pages and 9 plates.

A meeting for discussion in accordance with the regulations contained in the Standing Orders adopted last year was held in March of the current year. The discussion was based on a paper contributed by Sir Norman Lockyer "On the Chemistry of the Hottest Stars"; this, together with some of the principal contributions to the discussion, has been printed in the *Proceedings*.

In pursuance of the resolution of the International Conference on a Catalogue of Scientific Literature, the Council at the beginning of the Session, upon receiving the report of the British delegates to the Conference, and in accordance with the 26th resolution of the Conference, viz. :—

> (26) "That the Royal Society be requested to form a Committee to study all questions relating to the Catalogue referred to it by the Conference, or remaining undecided at the close of the present sittings of the Conference, and to report thereon to the Governments concerned,"

appointed a Committee with full executive powers. This Committee has since been engaged in developing a scheme for the preparation of the projected complete Catalogue of Scientific Literature.

The Committee has held a number of meetings, has devoted much time to the discussion of the difficult questions which arise in devising methods for carrying out so large a scheme as that contemplated by the Conference, and has appointed a number of special Sub Committees for drawing up schemes of classification for the several branches of science.

In view of the resolutions of the Conference, it appeared desirable to establish a (provisional) British Catalogue Committee, which might be consulted by the Committee of the Royal Society on questions relating to the collection and preparation of the material supplied by the scientific literature of Great Britain and Ireland, and might ultimately develop into the National Bureau for the United Kingdom contemplated by the Conference.

An appeal was, therefore, made by the Royal Society's Committee to the chief Societies representative of the sciences to be included in the Catalogue, and to certain important libraries, requesting the appointment of representatives.

Excepting in two cases, in which the nominations are delayed, all the societies and libraries applied to nominated representatives as requested.

At the first meeting of the British Committee thus constituted, representatives of nearly all the sciences included in the invitation attended, and expressed the willingness of the bodies they represented to co-operate in the work of the International Catalogue, though in some cases it was stated that they would not be able to contribute towards the expenses.

The further action to be taken by the various societies towards carrying out the work indicated above, will be considered by committees specially appointed by them for the purpose, and will form the subject of reports to be made to the British Committee.

With the object of keeping the delegates to the International Conference informed as to the work of the Committee, and of eliciting from them suggestions and criticisms upon the matters still under discussion, an *ad interim* statement of the progress so far made in its deliberations has been sent confidentially to all the delegates.

Progress continues to be made with the "Catalogue of Scientific Papers" and with the classified Index thereto.

As regards the supplementary portion of the Catalogue, the transcription of the copy is now approaching completion, and the Council hope that the first instalment of copy may be ready for the printer early in the new year. During the year ending on October 31, about 130 serials have been indexed for the purposes of the Catalogue, representing approximately 774 volumes, and involving the transcription of about 41,000 titles.

Of the classified Index to the Catalogue, about 275,000 slips have now been prepared, of which about 100,000 have been translated. An experimental classification of these slips is being made, in the course of which about 53,000 have already been classified under the eleven divisions sanctioned by the Catalogue Committee. During the past year about 65,000 slips have been prepared, of which about 13,000 have been revised, or translated, as occasion required.

Under the regulations for the administration of the Government Grant Fund, the Council have, upon the recommendation of the Government Grant Committee, made grants amounting to 3115*l.*, in addition to a grant of 1500*l.* made to the Joint Permanent Eclipse Committee out of the Reserve Fund towards the expenses of observing the approaching solar eclipse.

Early in the year, the Council appointed a Committee, called the Government Grant Review Committee, to report upon the manner in which the grants made from the Government Grant have been expended, and on the scientific results thereby attained. The Committee has met, but has not yet reported to the Council. The question of the reappointment of the Committee to make an annual report on the subject referred to them is under consideration.

The Report upon the results of the expedition sent out last year, under the direction of a Committee of the Royal Society, to investigate the structure of a Coral Reef by boring, was presented to the Society in a paper which was printed in the *Proceedings* of February 18, 1897 (vol. lx. p. 502). In that report, the Chairman of the Committee expressed the opinion that a more successful attempt would probably be made from Australia, and the Council therefore heard with satisfaction early in March that the authorities at Sydney would probably be willing to renew the attempt at boring with some assistance in money and influence from the Royal Society. Later, the Council was informed that a second expedition had been despatched from Sydney with the assistance of the Royal Geographical Society of Australasia on the agreement that the core, when recovered, should be sent to the Royal Society, and that all scientific details of the results of the expedition should be reserved for the Royal Society to publish. On the recommendation of the Coral Reef Committee, the balance remaining in hand from last year's expedition was voted in aid of the Australian expedition.

Early in the present month, the Secretaries received a preliminary report from Prof. David, in which he informed them that on September 6 the boring had attained a depth of 557 feet, and in the lower part had pierced more than one mass of coral limestone, one—about 20 feet thick—ending at 550 feet; they have also been informed that the boring was continued after the above-named date, and was still proceeding in generally similar material to that above, at a depth of 643 feet.

The Joint Permanent Eclipse Committee has organised expeditions for the observation of the Total Solar Eclipse in January next; and, at the request of the Committee, applications have been made to the War Office for leave of absence for Capt. Hills, R.E., in order that he may take part in the observation of the Eclipse; to the India Office, for facilities for the landing of instruments free of duty; to the Admiralty, for the conveyance of one of the observing parties to and from their observing station in one of H.M.'s ships; and to the Colonial Office, for facilities for the transhipment of that party from a passenger steamer to the ship of war at Colombo.

All these requests have been acceded to by the authorities.

The Committee appointed last year at the request of Her Majesty's Secretary of State for the Colonies, to investigate the subject of the Tsetse Fly Disease in South Africa has, in the course of the year, through Drs. Kanthack and Durham, and Mr. Blandford, conducted a careful investigation into the disease so far as it can be studied in this country, in subjects inoculated from a dog sent over from South Africa by Surgeon-Major Bruce. The Committee have, at the same time, been in communication with Surgeon-Major Bruce, keeping him informed of the progress of the inquiry here, and offering him suggestions for further investigation in South Africa. The experimental investigations, under Dr. Kanthack, are being pursued at Cambridge, with the aid of a grant of 200*l.*, generously placed at the disposal of the Council by Mr. A. Beit for this purpose. A letter, however, has recently been received from the Colonial Office, stating that Surgeon-Major Bruce's investigations have, for the present, been suspended, and he himself has been directed to return to military duty. The investigations have, so far, not resulted in the indication of any practical preventive treatment of the disease, but the life-history of the hæmatozoon, discovered by Surgeon-Major Bruce and shown by him to be the essential cause of the disease, has been carefully studied, and still presents problems of great interest.

Acting upon the recommendations of the Scientific Relief Committee, the Council has during the year granted 545*l.* to assist scientific men or their relatives in distress. Early in the year the Council found it expedient to codify the practice and original regulations, which had been modified from time to time since the formation of the Scientific Relief Fund, in a series of regulations for the guidance of the Committee in the administration of the fund. The revised regulations will be printed in the new edition of the "Year-Book."

In January the Council received a letter from the Royal Society of Canada urging them to move the Government to give their adhesion to a scheme for the unification of time at sea by the assimilation of the astronomical and civil day, with a view to the necessary alteration being made in the *Nautical Almanac* for 1901. The Council appointed an influential committee to consider the question, and received from them the following report:—

"The Committee report that as there is a great diversity of opinion amongst astronomers and sailors as to the advisability of the adoption of civil reckoning for astronomical purposes, and as it is impossible to carry out such a change in the *Nautical Almanac* for the year 1901, they do not recommend that the Royal Society should at present take any steps in support of the suggested change of reckoning."

Acting upon this advice, the Council have for the present refrained from taking any steps in support of the suggested change of reckoning.

The biennial election to the Joule Studentship was, under the terms of the Trust, placed by the Council last year in the hands of the Académie des Sciences, Paris, which has conferred the award on M. Jules Perrin, Doctor of Sciences, of the École Normale.

Early in the year, the attention of the Council was called to the system of teaching natural science in schools, and a Conference on the subject was arranged between the President and Council and the Fellows appointed by the Society as members of the governing bodies of the public schools. At this Conference an interesting discussion on the subject took place, and a general expression of opinion as to the desirability of attaching increased importance to the teaching of science as a necessary element of education was recorded; but the Council has not at present decided upon taking any further steps in the matter.

About a year ago the President and Council were invited by the Council of the British Association to co-operate in approaching Her Majesty's Government with a view to the establishment of a National Physical Laboratory. At the suggestion of the President and Council, a Joint Committee was formed to discuss the question, and to take action in furtherance of the desired object. This Committee waited upon Lord Salisbury, and laid before him the arguments in favour of the scheme. As a result a Committee has been appointed, with Lord Rayleigh as Chairman, to consider the desirability of establishing such a laboratory, and is now sitting. This Committee recently invited the Royal Society to appoint one or two Fellows to give evidence before the Committee on the subject under reference, and the President and Council have accordingly invited Lord Kelvin and Prof. Oliver Lodge to undertake this duty, which they have accepted.

In May last the Council received a request from Sir Benjamin Stone to nominate representatives upon the preliminary Committee for carrying out a scheme for a National Collection of Photographic Records, and Prof. Lapworth and Prof. Meldola were accordingly appointed to serve on the Committee.

Occasion arose during the past year for the exercise of the functions assigned in 1885 to a Committee designated the Indian Observatories Committee, which, however, has been held to be not a Committee of the Royal Society. The Astronomer Royal having called the attention of the President and Council to the anomalous position of this Committee, it was decided to appoint a new Committee of the Royal Society, to be named the Observatories Committee, to advise the Council on any questions similar to those formerly referred to the Indian Observatories Committee.

Reports have been received from the Kew Observatory Committee (published in the *Proceedings*), the Water Research Committee, and the Meteorological Council.

The Library continues to grow, especially in the section of scientific serials, and, although two book-cases have been added in the saloon, the question of shelf accommodation must soon become a matter for serious consideration. During the past year 10 new serial publications have been added to the 440 which the Society already received at regular intervals by exchange or purchase. Of these 450 serial publications, about

46	are issued	in	monthly	parts
14	,,	,,	weekly	,,
10	,,	,,	fortnightly	,,
10	,,	,,	quarterly	,,

and the remainder at irregular intervals.

Besides these, 53 complete books have been added to the library by presentation or purchase. Among these may be specially mentioned the first volume of the collected papers of the late Prof. J. Couch Adams, two further volumes of the collected papers of Prof. Cayley, Sir Joseph Hooker's "Journal of Sir Joseph Banks," Capt. Lyons's "Report on the Islands and Temples of Philæ," the Procès-Verbaux of the "Conférence Internationale des Étoiles Fondamentales de 1896," and the completion of Helmholtz s "Physiologische Optik."

THE ANNIVERSARY DINNER.

In the evening the Fellows and their friends dined together at the Whitehall Rooms, Hôtel Métropôle. The dinner was the most numerously attended of all that have been held in connection with the anniversary meetings of the Society. After the usual loyal toasts had been proposed by the President, Sir John Evans proposed the toast of "Her Majesty's Ministers and the Members of the Legislature," coupling with it the name of the Duke of Devonshire, the Lord President of the Council. In responding, the Duke of Devonshire is reported by the *Times* to have spoken as follows:—

As this is the first occasion on which I have had the honour and pleasure of being present at one of these gatherings, I am not acquainted with the subjects to which the speeches on this occasion are expected to be addressed. But, before accepting the invitation of your President to respond to this toast, I took the precaution of entering into a little negotiation with him, in which I succeeded in obtaining the concession that, whatever happened, I should not be called upon or expected to make a speech upon scientific subjects; and I think the President will bear me out in the statement which I make, that, therefore, I may be dispensed from any attempt to follow Sir John Evans, who has so kindly proposed this toast, into any scientific analogies which he may have been able to discover between the evolution of the human body and the government of the country. In making this confession of incapacity to address you upon scientific subjects, I feel that I am only acknowledging the existence in my own person of a defect which appears to be almost inherent in those who have devoted themselves to the pursuit of politics. I doubt very much whether since the time of Bacon there has ever, with one exception which I will refer to in a moment, been a Minister of the Crown who has been capable of saying anything upon these subjects to an assembly composed of the leading men of science of the day, such as those whom I have the honour of addressing, in words which would be worth their attention. The solitary exception which I can call to my mind is in the person of the present Prime Minister, who, if he had not devoted his powers so vigorously to political and public affairs, would, without doubt, have been an eminent man of science, and who, even now, amidst all his numerous and important avocations, has been able to keep up a not inconsiderable knowledge of the progress and discoveries of many branches of scientific pursuits. Gentlemen, I believe that the divorce which apparently has always existed between the pursuits of politics and science in our country has not been so complete in the case of other nations. We are all of us acquainted with the names of men in many foreign countries who have been eminent in science, and at the same time have, to say the least of it, been conspicuous in politics. Whether that fusion of political and scientific pursuits has always been a success, I do not think is a subject upon which I am called on to enter at the present moment. But, at all events, with regard to our own case, I think it appears to be certain that the calls which the pursuit of politics makes upon the time and strength of any man who desires to attain success in that career are so severe as to leave but little residue for the equally increasing calls upon the strength and time of those who aspire to distinguish themselves in scientific pursuits. But, while I do not look forward to any immediate closer connection between the pursuits of politics and science, I am not by any means sure that in some time not very far distant some greater knowledge and acquaintance with at least the results of scientific investigation and inquiry and research may not come to be a necessary part of the equipment of some portion at least even of our Government. The recent discoveries of science and their practical results have had so profound an influence on the social condition of all the peoples of the world, uncivilised as well as civilised; they have had, and are having, so great an influence upon the industrial progress, and therefore upon the growth or decline of nations, that it is almost impossible that some knowledge at least of the results, if not of the methods, of scientific discovery should become almost as indispensable a part of the training of statesmen as the knowledge of the instincts, the passions, and the interests of the people to which their studies have hitherto been almost entirely, or at any rate mainly, directed. The question whether with advantage the State can more directly interest itself in the direction or assistance of scientific inquiry is one which I have no doubt has been frequently discussed amongst you and upon which, probably, there would be considerable difference of opinion even among those who are assembled here. That is a question which I have no intention of entering upon, but there is a less ambitious object—the object of making some of the main principles of science and a knowledge of the results at least of the discoveries of science more accessible to the main body of the people—which has occupied our attention in recent years. It is also an object which has occupied a greater share of the attention of other nations, and one which, in my opinion, will require and demand greater attention on our part in the future. I hope and trust that at no distant time Her Majesty's Government may be able to make proposals and submit measures to you bearing in some degree upon the subjects to which I have referred. Among these I may mention such subjects as that of the creation of a teaching University for the City of London. I should not say for the city, but for London itself; and for the whole country some reorganisation of its secondary education, which is the indispensable foundation of any progress towards higher scientific study. I myself entertain a strong conviction that these are subjects of far greater importance than a great many which excite much more general and widespread interest. But strong as my own conviction, or the convictions of my colleagues, upon these subjects may be, I am not here to hold out to you any sanguine hope that we shall be able to induce Parliament to devote to them the attention which these subjects, in my opinion, richly deserve. Certainly we shall not be able to induce Parliament to give them the attention which they demand and require unless we can create in the country a widespread public opinion of their importance and their necessity. I think that many of those I have the honour of addressing, who stand at the head of the scientific professions, may be able in these matters to render great assistance to the Government by guidance, counsel, or advice, and, by helping us, thus assist to create throughout the country a public opinion of the importance of these matters. I think you can assist us in bringing home to the minds of many who have hitherto given, perhaps, an incomplete consideration to these questions the fact that that country cannot prosper which neglects the prosecution of either the higher or the subordinate branches of scientific research, or which is indifferent to the scientific training of those who are destined in the near or even the more distant future to conduct the industrial and commercial enterprises of this Empire. I will not trespass further upon your time except to thank you in the name of my colleagues for the very cordial manner in which this toast has been proposed for your acceptance by Sir John Evans and for the manner in which you have received it.

The American Ambassador in rising to propose the health of the Royal Society, said:—I can only follow at a great distance the example set by his Grace the Duke of Devonshire, and apologise at the beginning for my lack of qualification to address such an assembly as this. I regret that I have not even that smattering of scientific knowledge which would enable me to put on an appearance even of saying anything instructive or amusing. The only reason why I do not stand entirely mute is that I am unwilling by silence to seem indifferent to the great compliment which has been paid me in assigning to me this honourable duty. It is in associations of men like this, in institutions like the Royal Society, and similar bodies in America, of course of more recent date and of narrower resources, that there exists one of the strongest bonds of union that unite the two great branches of our race. They are held together by a common love and pursuit of universal truth, by devotion to the highest interest of mankind, by a kindred passion for light and progress. In your pursuits there is everything that unites and nothing that divides. The results of science are all gain and no loss. The triumphs of war are bought by the tears and anguish of both sides. The success of diplomacy and trade are often attended by the discomfiture of one party. But the whole world is brightened and made more livable by the achievements of a Faraday, a Morse, or a Fulton. The genius of a Lister or a Morton lessens incalculably the whole vast sum of human suffering, and every invention or discovery on either side of the sea—the product of the patient, self-denying labour of any of the scholars of our race, whether it be Lord Kelvin or Edison, Bessemer or Graham Bell, Huxley, Tyndall, or Marsh—is at once thrown into the common stock of the world's intellectual riches, profiting every one and injuring none. It is for this reason that I—although I have no claim to sit among scholars or men of science—am glad to be allowed to come here and pay my humble tribute of profound respect to those eminent men who, under the auspices of this venerable institution, are doing so much to hasten the glad day when all misconceptions and misunderstandings, born of ignorance and prejudice, shall fade away in the light of dawning truth and widening knowledge; when, to use the language of your great poet, who was himself through life a patient and devoted student of science, "Universal Peace" shall

> Lie like a shaft of light across the land,
> And like a lane of beams athwart the sea.

I have the honour to propose the health of the Royal Society, and to couple with the toast the name, honoured and revered in every country upon earth where high genius, devoted to the loftiest purposes, is valued and appreciated—the name of Lord Lister.

The President responded, and afterwards proposed the toast of "The medallists," to which Prof. Forsyth replied. The dinner terminated with the toast of "The guests," proposed by Lord Kelvin, and responded to by Prof. Lewis Campbell.

USEFUL INSECT PRODUCTS.

THE commercial value of the insects from which cochineal, lac, and Japanese white wax are obtained were briefly referred to, by Dr. L. O. Howard, in the course of a short paper on a useful American scale insect, read at the last meeting of the Association of Economic Entomologists. It was pointed out that for many years the cochineal or cactus scale insect, now called *Coccus cacti*, was used as the basis of an important red dye, until practically superseded by the introduction of aniline dyes. In the same way the European Porphyrophora was used in the production of a purple dye. Aside from the dye insects, we have the lac insects, of which a single species, *Tachardia lacca*, produces practically all of the shell-lac, stick lac, and button lac of commerce. This species is Asiatic in its distribution; but in the south-west States, upon the very abundant creosote bush, a lac insect occurs in an enormous quantity, the commercial possibilities of which have not been developed. This is the congeneric species, *Tachardia larreæ* (Comstock). This insect has been known to science only since 1881, but was long prior to that time known to the Indians, who for many years have been in the habit of collecting the scale insects and forming them into more or less elastic balls, which their runners were in the habit of kicking before them as they journeyed from one point to another. There are other species of the same genus inhabiting North America. The third substance of commercial importance derived from scale insects is a pure white wax, which is secreted by the Chinese and Japanese *Ericerus pé-la* and by the Indian *Ceroplastes ceriferus*. On account of its expense, and on account of more or less available substitutes, this wax has not become of great commercial importance in Europe, but is much used in the Eastern countries, both in the making of wax-candles and in medicine. The Chinese wax is said to have ten times the illuminating power of other waxes. It is a beautiful wax, resembling beeswax in its chemical composition more nearly than the vegetable waxes, and is clear white in colour. Dr. Howard calls attention to the fact that in the far south-west of the United States there is a wax insect (*Cerococcus quercus*) which apparently needs careful investigation from the commercial point of view. Three species of oak are recorded by Prof. Comstock as offering food for this insect, viz. *Quercus oblongifolia*, *Q. undulata* variety *wrightii*, and *Q. agrifolia*. Dr. Howard recently received specimens of the insect from Mesa Grande, California. They were not sent in position on the twigs, but had been removed from the twigs, and compressed together by hand into a more or less pliable lump, somewhat resembling a lump of india-rubber, but not possessing the same elasticity. The substance, it is remarked, makes an admirable chewing gum, as it takes and retains flavours better than other gums. Part of it has been proved by chemical analysis to be a true wax, and part resembles rubber in its physical properties. The product is not only interesting from a chemical standpoint, but it may prove to be also of economic value, as the supply is well-nigh inexhaustible. By directing attention to these products of potential importance, Dr. Howard demonstrates the commercial uses of entomology.

THE RAINFALL OF SOUTH AFRICA.

A SHORT time ago the Meteorological Commission of Cape Town placed in the hands of Dr. Alexander Buchan the rainfall statistics obtained at 278 stations in Cape Colony during the ten years 1885–1894, in order that he might analyse and discuss them. Dr. Buchan has now completed his task, and the results are given in a publication just received from the Meteorological Commission. The report contains sixteen maps printed in different shades of blue to exhibit the rainfall in South Africa (from lat. 25° to 35° S.) for every month of the year, the maximum annual rainfall, the minimum rainfall, the mean annual rainfall, and the range of mean annual rainfall. All the infor-